CHULITNA ELECTROMAGNETIC AND MAGNETIC AIRBORNE GEOPHYSICAL SURVEY DATA COMPILATION

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CHULITNA ELECTROMAGNETIC AND MAGNETIC AIRBORNE GEOPHYSICAL
SURVEY DATA COMPILATION
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Stevens Exploration Management Corp., and Fugro Airborne Surveys Corp.

ABSTRACT

This Chulitna electromagnetic and magnetic airborne geophysical survey is located in interior Alaska in
the Chulitna mining district, about 200 kilometers south of Fairbanks, Alaska and about 200 kilometers north
of Anchorage, Alaska. Frequency domain electromagnetic and magnetic data were collected with the
DIGHEM¹ system in September 1996. A total of 2647.7 line kilometers were collected covering 943.5 square
kilometers. Line spacing was 400 meters (m). Data were collected 30 m above the ground surface from a
helicopter towed sensor platform (“bird”) on a 30 m long line.

PURPOSE

This airborne geophysical survey is part of a program to acquire data on Alaska’s most promising mineral
belts and districts. The information acquired is aimed at catalyzing new private-sector exploration, discovery,
and ultimate development and production. The purpose of the survey was to map the magnetic and
conductive properties of the survey area. The survey area contains the Golden Zone, a historically producing
mine and currently active gold exploration property. Mineral prospects in the survey area include Honolulu
and Canyon Creek. Other gold and base-metal anomalies, altered zones, favorable lithologies, and structural
zones are known to exist throughout the survey area.

SURVEY OVERVIEW DESCRIPTION

This document provides an overview of the survey and includes text and figures of select primary and
derivative products of this survey. A table of digital data packages available for download is provided to assist
users in data selection. For reference, a catalog of the available maps is presented in reduced resolution. Please
consult the metadata, project report, and digital data packages for more information and data.

ACKNOWLEDGMENTS

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² Fugro Airborne Surveys Corp.
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### REFERENCES


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http://doi.org/10.14509/14454
DGGS Staff, Dighem, and WGM, Inc., 1997, Disk containing gridded files and section lines of 1996 geophysical survey data for Chulitna mining district: Alaska Division of Geological & Geophysical Surveys Public Data File 97-6, 1 DVD. http://doi.org/10.14509/1748


Figure 1. Chulitna electromagnetic and magnetic airborne geophysical survey location shown in interior Alaska (inset). Chulitna survey area shown with adjacent DGGS geophysical surveys, landmarks, relevant 1:250,000-scale quadrangle boundaries, mountain ranges, rivers, glaciers, and elevation hillshade.
Figure 2. Flight path with orthometric image.
Figure 3. Simulated magnetic total field grid with orthometric image. The magnetic total field data were processed using digitally recorded data from a Picodas 3340 cesium magnetometer. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtracting the digitally recorded base station magnetic data, (2) IGRF corrected (IGRF model 1985, updated to October, 1996), (3) leveled to the tie line data, (4) a constant value of approximately 56,000 nT was added to all data, and (5) interpolated onto a regular 100 m grid using a modified Akima (1970) technique.
Figure 4. Calculated first vertical derivative grid with orthometric image. The first vertical derivative grid was calculated from the diurnally-corrected, IGRF-corrected total magnetic field grid using a FFT base frequency domain filtering algorithm. The resulting first vertical derivative grid provides better definition and resolution of near-surface magnetic units and helps to identify weak magnetic features that may not be evident on the total field data.
Figure 5. Analytic signal grid with orthometric image. Analytic signal is the total amplitude of all directions of magnetic gradient calculated from the sum of the squares of the three orthogonal gradients. Mapped highs in the calculated analytic signal of magnetic parameter locate the anomalous source body edges and corners (such as contacts, fault/shear zones, etc.). Analytic signal maxima are located directly over faults and contacts, regardless of structural dip, and independent of the direction of the induced and/or remanent magnetizations.
Figure 6. 56,000 Hz coplanar apparent resistivity grid with orthometric image. The DIGHEM$^\text{V}$ EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 900 and 5,000 Hz while three horizontal coplanar coil-pairs operated at 900, 7,200, and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 56,000 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 100 m grid using a modified Akima (1970) technique.
Figure 7. 7,200 Hz coplanar apparent resistivity grid with orthometric image. The DIGHEM\textsuperscript{V} EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 900 and 5,000 Hz while three horizontal coplanar coil-pairs operated at 900, 7,200, and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 7,200 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 100 m grid using a modified Akima (1970) technique.
Figure 8. 900 Hz coplanar apparent resistivity grid with orthometric image. The DIGHEM\textsuperscript{EM} EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 900 and 5,000 Hz while three horizontal coplanar coil-pairs operated at 900, 7,200, and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 900 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 100 m grid using a modified Akima (1970) technique.
### Table 1.

Copies of the following maps are included at the end of this booklet. The low-resolution, page-size maps included in this booklet are intended to be used as a search tool and are not the final product. Large-scale, full-resolution versions of each map are available to download on this publication’s citation page: [http://doi.org/10.14509/30416](http://doi.org/10.14509/30416)

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ALASKA
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2004
TOTAL FIELD MAGNETICS AND
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OF THE NORTHWEST CHULITNA MINING DISTRICT,
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1997
IGRF GRADIENT REMOVED
TOTAL FIELD MAGNETICS AND DETAILED ELECTROMAGNETIC ANOMALIES OF THE NORTHEAST CHULITNA MINING DISTRICT, ALASKA